CLAIMS

What is claimed is:

1. A method for fabricating a magnetic head, comprising:

creating a structure, comprising:

forming a first pole;

forming a cap above the first pole, empty side regions being positioned laterally on opposite sides of the cap;

forming a dielectric gap layer above the cap;

forming a second pole above the gap layer; and

milling the structure for creating a shoulder of the first pole tapering upwardly towards the cap.

2. The method as recited in claim 1, further comprising filling the side regions with a material selected from a group consisting of a dielectric, a material susceptible to removal by reactive ion etching, and a material susceptible to removal by milling.

3. The method as recited in claim 2, further comprising performing in sequence prior to milling the structure: removing exposed portions of the gap layer, and removing the material used to refill the side regions.

4. The method as recited in claim 1, wherein side edges of the second pole, gap layer, and cap are substantially vertically aligned.

5. The method as recited in claim 1, wherein the gap layer is alumina.

6. The method as recited in claim 1, wherein the gap layer is silicon dioxide.

7. The method as recited in claim 1, wherein the gap layer is nonmagnetic metal.

8. The method as recited in claim 1, further comprising forming a seed layer above the gap layer, the second pole being plated on the seed layer.

9. The method as recited in claim 1, wherein the structure is ion milled.

10. A method for fabricating a magnetic head, comprising:
creating a structure, comprising:
forming a first pole;
forming a cap above the first pole, empty side regions being positioned laterally on opposite sides of the cap;
forming a nonmagnetic metal gap layer above the cap;
forming a second pole above the gap layer; and
milling the structure for creating a shoulder of the first pole tapering upwardly towards the cap.

11. The method as recited in claim 10, further comprising filling the side regions with a material selected from a group consisting of a dielectric, a material susceptible to removal by reactive ion etching, and a material susceptible to removal by milling.

12. The method as recited in claim 11, further comprising performing in sequence prior to milling the structure: removing exposed portions of the gap layer, and removing the material used to refill the side regions.

13. The method as recited in claim 10, wherein side edges of the second pole, gap layer, and cap are substantially vertically aligned.

14. The method as recited in claim 10, wherein the structure is ion milled.

15. A method for fabricating a magnetic head, comprising:
forming a first pole;
forming a cap above the first pole
removing opposite side regions of the cap;
refilling the side regions with a material selected from a group consisting of a dielectric, a material susceptible to removal by reactive ion etching, and a material susceptible to removal by milling;
forming a gap layer above the cap;

forming a second pole above the gap layer;

removing exposed portions of the gap layer;

removing the material used to refill the side regions, thereby exposing peripheral regions of the cap; and

milling the cap and first pole for creating a shoulder of the first pole tapered upwardly towards the cap;

wherein side edges of the second pole, gap layer, and cap are substantially vertically aligned after the milling.

16. The method as recited in claim 15, wherein the exposed portions of the gap layer are removed by reactive ion etching.

17. The method as recited in claim 15, wherein the gap layer is a dielectric.

18. The method as recited in claim 15, wherein the gap layer is nonmagnetic metal.

19. A method for fabricating a magnetic head, comprising:

forming a first pole;

forming a gap layer above the first pole;

forming a second pole above the gap layer;

forming a layer of photoresist above the second pole;

patterning the photoresist such that the photoresist covers areas of the gap layer positioned towards the second pole;

removing exposed portions of the gap layer;

removing part of exposed portions of the first pole for forming steps in the first pole on opposite sides of the photoresist;

removing the photoresist; and

milling for creating a shoulder of the first pole tapering upwardly towards the cap.

20. The method as recited in claim 19, wherein side edges of the second pole, gap layer, and cap are substantially vertically aligned.

21. The method as recited in claim 19, wherein the gap layer is a dielectric.

22. The method as recited in claim 21, further comprising forming a seed layer above the gap layer, the second pole being plated on the seed layer.

23. The method as recited in claim 19, wherein the gap layer is a metal.

24. A head formed by the method recited in claim 1.

25. A head formed by the method recited in claim 10.

26. A head formed by the method recited in claim 15.

27. A head formed by the method recited in claim 19.

28. A magnetic storage system, comprising:

magnetic media;

at least one head formed according to the method recited in claim 1;

a slider for supporting the at least one head; and

a control unit coupled to the head for controlling operation of the head.

29. A magnetic storage system, comprising:

magnetic media;

at least one head formed according to the method recited in claim 19;

a slider for supporting the at least one head; and

a control unit coupled to the head for controlling operation of the head.